Kolbé (D. W.)

DESCRIPTION

OF THE

ORTHOPÆDIC APPARATUS

EMPLOYED IN THE

TREATMENT OF DEFORMITIES AND DEFICIENCIES OF THE HUMAN BODY,

WITH

DIRECTIONS FOR TAKING MEASUREMENTS FOR THEIR APPLICATION.

FOURTH EDITION.

BY

D. W. KOLBÉ,

Manufacturer of Surgical Instruments
and
Mechanist to the Philadelphia Orthopædic Hospital.

No. 15 SOUTH NINTH STREET.

PHILADELPHIA:
COLLINS, PRINTER. 705 JAYNE STREET
1876.

DESCRIPTION

OF THE

ORTHOPÆDIC APPARATUS

EMPLOYED IN THE

TREATMENT OF DEFORMITIES AND DEFICIENCIES OF THE HUMAN BODY,

WITH

DIRECTIONS FOR TAKING MEASUREMENTS FOR THEIR APPLICATION.

FOURTH EDITION.

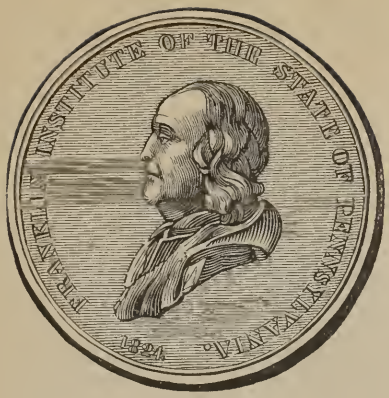
BY

D. W. KOLBÉ,

Manufacturer of Surgical Instruments
and
Mechanist to the Philadelphia Orthopædic Hospital.

No. 15 SOUTH NINTH STREET.

PHILADELPHIA:
COLLINS, PRINTER. 705 JAYNE STREET.
1876.



PREFACE TO THE FIRST EDITION.

Having been frequently consulted by physicians and others living at a distance, as to the mode of taking measurements for the construction of mechanical contrivances for the treatment of deformities and deficiencies of the body, I have been induced to prepare this catalogue, which contains accurate directions in these particulars, so that blunders cannot possibly occur if these directions are properly followed.

The forms of instruments described are of the most approved kinds, and embrace the most recent advances and discoveries in mechanical therapeutics, as exhibited in the latest and most elaborate works on this subject. They are sanctioned by the large mass of practising surgeons, as shown in Prof. Gross' System of Surgery, and in Dr. Wales' Mechanical Therapeutics, in which works fuller accounts of these apparatus may be found.

I am prepared to furnish, besides the above-described apparatus, any form of surgical appliance or modification of apparatus that may be ordered by the surgeon.

D. W. KOLBÉ.

PREFACE TO THE SECOND EDITION.

Two years have elapsed since I issued the first edition of my pamphlet on Orthopædic Apparatus, and the success it has met with has emboldened me again to present it in an enlarged and revised form.

My connection with the invention and improvement of mechanical appliances for the treatment of deformities and deficiencies of the human body for nearly thirty-five years, both in this country and in Europe, has given me an aggregate of experience second to none engaged in the pursuit of this practical art. The result of this experience has been the development of many new principles in mechanical therapeutics, and the invention of improved and new apparatus, among which I may mention my apparatus for club-foot, which, by all odds, takes the highest rank in the esteem of the profession. The great advantages possessed by this instrument over all others have led many persons to appropriate my invention and to claim the merit of its discovery. In order to sustain my claims I will present as succinctly as possible the facts upon which they are based; and trace the origin and perfection of my apparatus.

It was in 1781 that Scarpa devised the first shoe with a steel plate for the relief of club-foot, and his was the principal method of treatment until Stromeyer introduced the operation of the division of the tendo-Achillis in 1831.

This operation, requiring as it did appliances to maintain the positions designed and perfect the cure of the deformities for which it was instituted, may be said to have imparted new energy to, if it was not even the initial or starting-point of, the present scientific system of mechanical therapeutics.

I began to study the manufacture of surgical instruments and orthopædic appliances in 1837, at Marburg University (founded 1527). I soon learned that, in order to make good and useful instruments, I must be acquainted with operations, and that the construction of suitable appliances necessitated an anatomical knowledge of those parts, at least, most frequently affected by deformities. In 1842, I acted more fully upon previously formed resolutions by witnessing, at Cologne, a number of operations for the relief of deformities in general, and of club-foot in

particular, for which latter a modification of Stromeyer's instrument was used in the after-treatment, it being considered the most perfect apparatus at that time. It was, however, incapable of holding the foot in the required position without causing pain, and often became the cause of unfavorable results. After various experiments I succeeded, in 1843, at Brussels, Belgium, in making the first important improvement in the foot-piece, which corresponded with the *medio-tarsal* articulation; and this I adapted to the apparatus of Dr. Martin, while in Paris during 1844, '45, and '46, it being the one in general use at that time throughout France; in fact, my entire time, while in Paris, was devoted to the manufacture of instruments and apparatus, while I did not neglect the advantages offered by surgical clinics. In a word, I studied the science in its adaptation to cases, and became identified with its progress in the principal cities on the continent. When I came to this city, in 1847, I found that I had wisely directed my attention previously, and that there was a demand for such instruments and appliances as I was able to furnish. This fact, together with the indorsement of our eminent surgeons (whom I shall ever hold in grateful remembrance), induced me to devote every energy to the development of both the science and the art of those parts of my business which had already engrossed so much of my attention and study; and I think I may add that if I have given more time than others to the perfection of apparatus for the relief of deformities, it has been associated with a modest estimation of my ability to do so. The number of cases placed under my care for the mechanical part of the after-treatment of club-foot enabled me, through the practical experience gained, to so simplify and improve my apparatus that it became, even in 1855, well represented in works on surgery, and favorably received by the medical profession throughout the land.

In 1867, the Philadelphia Orthopædic Hospital was established, and I was appointed its mechanist. The large number and the great variety of cases which have already been successfully treated at this hospital, are additional evidence that I have made many improvements in apparatus for the mechanical treatment of deformity. Various plans of treatment of club-foot and construction of apparatus have been suggested from time to time, but have never met with success, because their inventors were lacking both in experience and mechanical skill, so that they are more certain to disappoint than to give satisfaction to the practitioner who may be induced to rely upon them.

The following directions for the application of my articulated club-foot shoe, as shown in Fig. 9, page 9, will be of use to those desiring success in the treatment of cases.

In infants affected with equino-varus, and when the surgeon intends not to divide the tendons, the foot is manipulated into as nearly the normal position, as the contracted tendons and the displaced tarsus will allow without being provocative of inflammation: in this position it is firmly held, while a bandage, extending up the leg, is carefully applied, so that the entire foot is covered and protected from the apparatus, which, after being adjusted, should then be applied. As this apparatus simulates the natural motions of the foot, and is intended to retain the position produced by the manipulations, it should be adapted to this purpose by its regulating screws.

In placing the foot in the shoe, see that the sole is in perfect apposition with the sole of the shoe, and the heel well back, the latter precaution being one of the most important and essential of the directions to be observed; still holding the foot firmly, lace the gaiter, and buckle the straps around the leg and thigh, in order that those bands, which have connected with them the lateral bars, may be properly adjusted. The heel is held in the desired position by the regulating screw at the ankle-joint, and should equalize the pressure of the gaiter lacing over the instep. The foot is turned outward by the screw concealed at the bottom of the heel; the steel frame on the side and front part of the shoe which resists the inversion of the foot, should fit well over the great toe, and it is sometimes necessary to adjust it, which can easily be done, as it is made of annealed steel which permits its being bent. When this direction is well complied with, it is not important to lace the front part of the shoe.

As it is necessary that the patient should wear the shoe constantly, it should be removed and reapplied twice daily for the first week, after which once daily is sufficient; and the foot should be manipulated and bathed at each removal of the apparatus. After a period of from three to six weeks, an ordinary stocking may take the place of the bandage, and the continuation of the treatment be intrusted to the parents or nurse.

In children old enough to walk, and whose feet have been brought into the normal position, it is advisable to use, during the day only, an additional and less complicated shoe, which, from its confining the foot in the required position, without the necessity of adjustment, while at the same time it allows the natural movements of locomotion, it is called the walking shoe (see Figs. 11, 12, 13, 14, pp. 9, 10). This shoe should be worn until the foot has become sufficiently strong to retain the natural position without the aid of support. The advantages derived from having shoes for both night and day use may be thus stated:—

1st. They are less expensive eventually.
2d. They are more comfortable to the patient.
3d. They are more effectual in establishing a cure.

The last is due to the fact that the one which is most likely to be interfered with is worn at night, while that worn during the day cannot be disarranged.

The walking shoe should not be confounded with the ordinary weak-ankle supporter furnished by some makers, for, although it is similar in appearance, in construction and application it is very different.

Immediately after the division of the tendons in those cases requiring it, the foot should be brought into as nearly as possible the normal position, and the directions previously given carried out, great care being observed in the application of both bandage and apparatus to avoid excoriation. Three or four hours after the operation it will be well to loosen the apparatus, but not enough to allow the foot to resume its deformed position. The next day both the apparatus and bandage should be entirely removed, so as to bathe and examine the foot; and in reapplying them, cotton or some soft material should be interposed so as to prevent pressure for too long a time on any given spot.

In from four to six days the inflammation will have sufficiently subsided to allow manipulations at every removal of the apparatus during the treatment. Tenotomy is advisable in most of the cases not corrected up to two years of age, and from that to twenty years of age and more, should be performed not only as an adjunct to the treatment, but as a proceeding upon which a cure can alone be promised. To this general rule for tenotomy, some paralytic cases will, of course, form exceptions.

Sometimes cases of long standing are presented for treatment; they may have walked with their deformity, or have had operations frequently performed without success; in these the tarsal malformations are firm and the overlying tissues thickened and shortened, and even after tenotomy is performed, the strength of the surgeon will be found insufficient to break up the adhesions, stretch the parts, or restore the foot to its normal position, and yet without this it would be useless to attempt a cure. In such cases my club-foot stretcher (see Fig. 15, page 10) is to be used. Success in very severe cases has attended its use in the Philadelphia Orthopædic Hospital, where the custom is to place the patient under the influence of an anæsthetic, perform tenotomy, and then apply the stretcher; the articulated shoe (Fig. 10, page 9) is then put on, and the treatment conducted as before described, and if the stretcher is used from time to time, it will be found that in two or three weeks the walking shoe may be worn.

By permission of the Board of Surgeons of the Philadelphia Orthopædic Hospital, I have added, for illustration to the various appliances, a number of wood-cuts, accurate copies of photographs of some of the extreme deformities treated at that charity.

D. W. KOLBÉ.

Fig. 1.

Talipes varus.

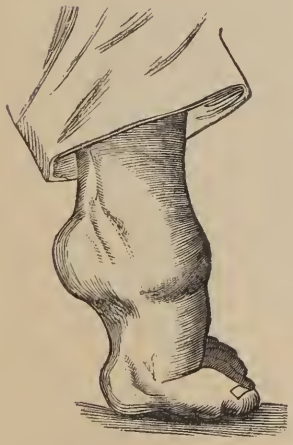
Fig. 2.

Talipes valgus.

Fig. 3.

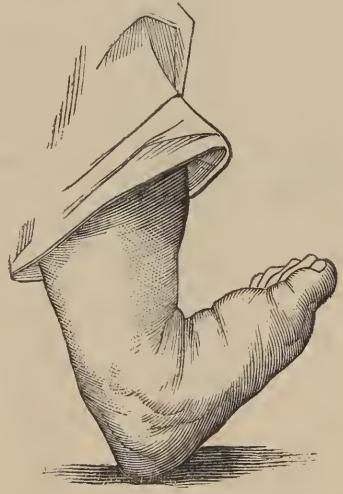
Normal foot.

Fig 4.



Talipes equinus.

Fig. 5.



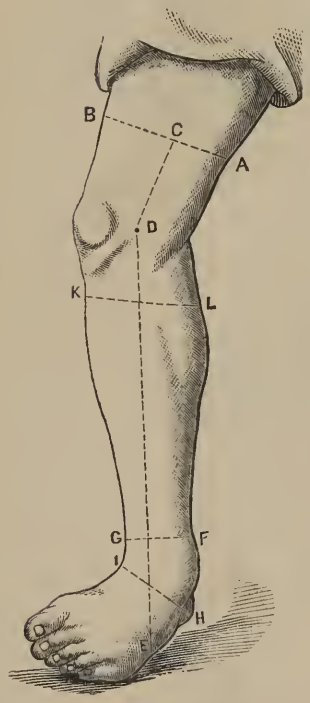
Talipes calcaneus.

APPARATUS FOR DEFORMITIES OF THE LOWER EXTREMITIES.

Apparatus for Club-Foot.

Talipes varus, valgus, and equinus.

Fig. 6.



GUIDE FOR MEASUREMENTS.

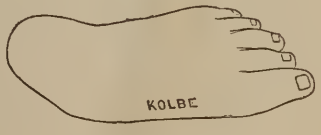
B A. Circumference at the middle of thigh.
K L. Circumference below the knee.
G F. Circumference above the ankle.
I H. Circumference over instep and heel.
C D. Length from middle of thigh to centre of knee-joint.
D E. Length from centre of knee-joint to sole of foot.

To give a correct idea of the deformity, place the foot on a sheet of paper and draw a line around it, to obtain its contour, as shown in Figs. 7 and 8. It will be found in children from two years of age upwards, who have been unsuccessfully treated, that, for want of support from the heel, the muscular power of the knee has been impaired, causing the knee to bend backward and inward. This fact should be mentioned in ordering, as the apparatus can be constructed to remedy this defect.

Fig. 7.

Varus.

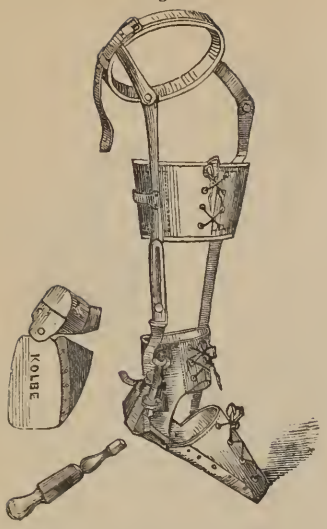
Fig. 8.



Valgus.

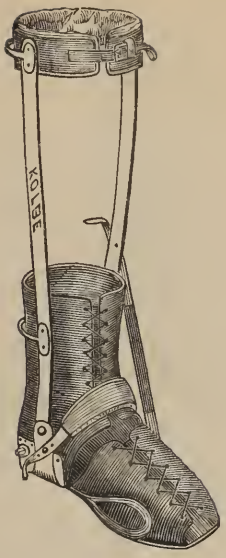
State age and sex of the patient; also whether tenotomy has been, or will be, resorted to.

Fig. 9.



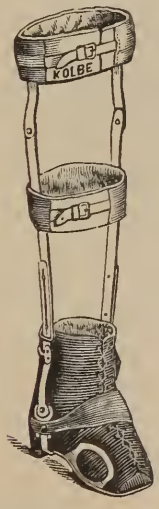
Kolbé's articulated club-foot shoe for the correction of talipes varus, valgus, and equinus, either in connection with tenotomy or by manipulation alone. It is preferable in children from a few weeks to three years of age.

Fig. 10.



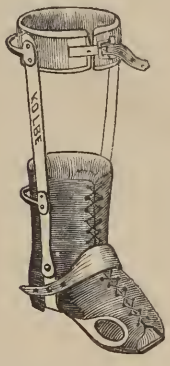
Kolbé's articulated club-foot shoe for the correction of talipes varus, valgus, and equinus. It is preferable in patients from three years of age and upwards, and intended for night use in particular.

Fig. 11.



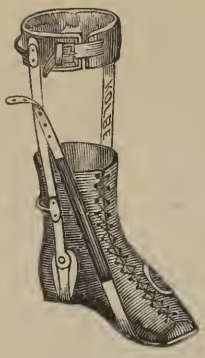
Kolbé's walking shoe for the after-treatment of club-foot, with support for the knee-joint. It is preferable in cases where the knee bends backward and inward.

Fig. 12.



Kolbé's walking shoe for the after-treatment of club-foot. It is preferable when the knee-joint is perfect.

Fig. 13.

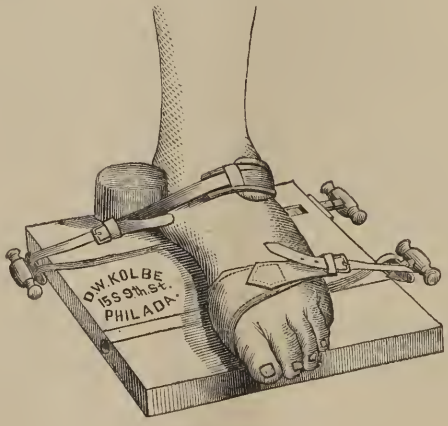


Kolbé's walking shoe for the after-treatment of club-foot. It is preferable in cases where paralysis of the extensors is marked, or the contraction of the tendo Achillis has not been entirely overcome.

Fig. 14.

Kolbé's walking shoe for the after-treatment of club-foot, showing the position for application. The lateral bars should not be brought in position until the shoe is laced and the strap fastened over the instep.

Fig. 15.



Kolbé's club-foot stretcher.

Fig. 15 illustrates Kolbé's club-foot stretcher. It consists of a foot-board in which are imbedded three regulating screws; its mechanical action is fully illustrated by the wood-cut. It can be used for the right or left foot by simply changing the screws to which the straps are attached from the one side to the other. The cushion, which acts as a counter-lever at the heel, simply needs to be screwed to the opposite side.

When the foot is thus placed in proper position, the surgeon has entire control over it, and can manipulate it with facility.

Calcaneal Club-Foot.

GUIDE FOR MEASUREMENTS.

Circumference above the knee. ——

Circumference below the knee. ——

Length from middle of thigh to centre of knee, from centre of knee to sole of foot.

In taking the measurements of the foot, let it rest lightly on a sheet of paper, and draw a line around it. Take the circumference immediately above the ankle, around the heel and instep, over the instep, and around the toes.

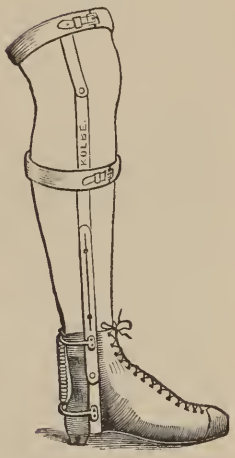
State age and sex of the patient.

Fig. 16.

Talipes calcaneus.

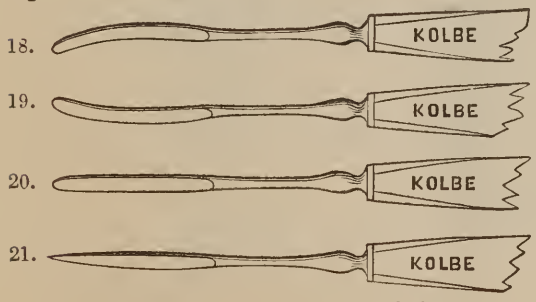
This apparatus resembles somewhat the one described on page 9, Fig. 11, used in the after-treatment for *Talipes varus*, *valgus*, and *equinus*. It differs from it, however, in possessing a spiral or India-rubber spring attached between two circular arms stretching across from one lateral bar to the other, one above, and the other below the centre of the ankle-joint. By the action of the spring the elongation of the tendo Achillis is overcome. The sole of the shoe is provided with a steel plate sufficiently strong to maintain the normal position of the plantar arch.

Fig. 17.



Application of Kolbé's apparatus for *Talipes calcaneus*.

Figs.



Four different forms of tenotomy knives.

Fig. 22.

Double inverted club-foot. (From photograph.)

Fig. 23.

Result after the division of tendons and fascia with walking shoe applied. (From photograph.)

Fig. 24.

Double inverted club-foot and club-hand. (From photograph.)

Fig. 25.

Result after the division of tendons and fascia with apparatus applied. (From photograph.)

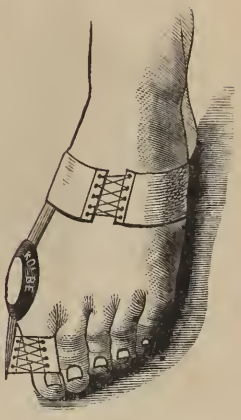
Apparatus for Bunions.

Fig. 26.

GUIDE FOR MEASUREMENTS.

Circumference over the instep.

Outline of the foot obtained by placing it on a sheet of paper and drawing a line around it. See Fig. 7, page 8.



Biggs' Apparatus.

Figs. 27 and 28 illustrate a more simple mode of treatment for the relief of bunions. A soft cup-shaped pad of thick leather or felt, with an

Fig. 27.

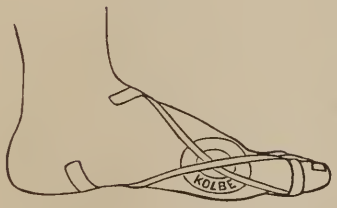


Fig. 28.

opening in the centre, is placed directly over the bunion, the toe is straightened, and while held in that position a long narrow strip of adhesive plaster is turned around the extreme end of the toe, from which point it is thrown crosswise tightly over the pad and fastened around the foot, as shown in the drawing. The pad prevents the bunion from irradiating, and forms a part of a lever to hold the toe in the normal position; a shoe or boot may be worn with comfort, but it should be sufficiently large to prevent the toes from being forced together. Renewal of the adhesive plaster from time to time will secure a satisfactory result.

Apparatus for Genu valgum, or Knock-Knee.

Fig. 29.

GUIDE FOR MEASUREMENTS.

→ Circumference of upper third of thigh.

→ Circumference above knee.

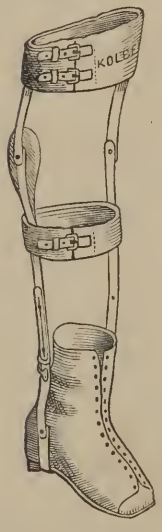
→ Diameter of knee.

→ Circumference below knee.

Length from upper third of thigh to centre of knee; from centre of knee to sole of foot.

In taking the measure of the foot, let it rest lightly on a sheet of paper, and draw a line around it, as illustrated in Fig. 7, page 8. Take the circumference immediately above the ankle, around the heel and instep, over the instep, and around the toes. It is also desirable to have the outlines of the inner side of the knee-joint, which can be obtained as directed on page 33, angular curvature. The age and sex of the patient should be given.

Fig. 30.



Kolbé's apparatus for knock-knee.

Knock-knee is an inward inclination of one or both knees, caused by a relaxed and elongated condition of the internal lateral ligament of the knee-joint, and increased by the superincumbent weight of the body. To relieve this deformity, numerous mechanical contrivances have been constructed and employed. The one represented in Fig. 30 is the simplest and most convenient for the patient to wear, while its efficacy is none the less. It consists of a plain shoe, to which two lateral steel bars, reaching to the upper third of the thigh, are attached, and connected with calf and thigh bands; and it is provided with joints corresponding with the natural articulations, to allow locomotion. The knee is confined in its normal position by a well-padded cap.

Fig. 31.

Knock-knee. (From photograph.)

Fig. 32.

Result of mechanical treatment. (From photograph.)

Fig. 33.

Knee bending backward. (From photograph.)

Fig. 34.

Result of mechanical treatment. (From photograph.)

Apparatus for Genu extrorsum, or Bow-Legs.

Fig. 35.

GUIDE FOR MEASUREMENTS.

→ Circumference of upper third of thigh.

→ Circumference above knee.

→ Diameter of knee.

→ Circumference below the knee.

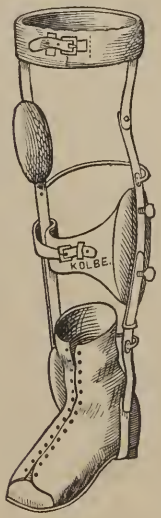
→ Circumference.

The length to be taken on the inner side of the limb, from the upper part of thigh to the centre of knee, from the centre of knee to sole of foot.

The curvature of the outside of the leg should be given, which can be obtained as directed on page 33, angular curvature. The age and sex of the patient should also be stated.

In taking measure for the shoe, see page 14. If the deformity is very marked, a photograph showing the form of the lower extremity will be advantageous.

Fig. 36.

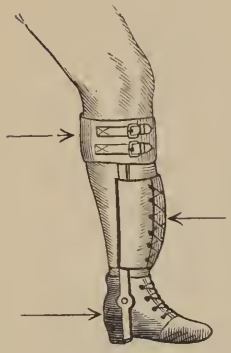


Kolbé's apparatus for bow-leg.

As bow-legs is a deviation in the opposite direction to that of knock-knee, whether it results from elongation of the external ligaments of the knee, or by curvature of the leg bones, the mechanical appliance for it illustrated in Fig. 36 is constructed upon the same principle as that described on page 14, Fig. 30, with the difference that, in addition, a steel plate well padded is attached to the external lateral bar, and regulated by means of screws, while at the same time provision is made, by the continuation of the leather padding, to correct anterior curvature of the tibia.

Apparatus for Anterior and Lateral Curvature of the Leg.

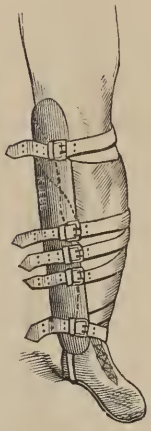
Fig. 37.



Apparatus for anterior curvature of the leg. Adaptable only in slight cases of this deformity.

(Guide for measurements, see page 16, Fig. 35.

Fig. 38.



Bigg's apparatus for lateral curvature of the leg. As the patient's locomotion is impaired by the application of this apparatus, it is not recommendable.

Fig. 39.

Bow-legs. (From photograph.)

Fig. 40.

Result of mechanical treatment. (From photograph.)

Apparatus for the Ankle.

Fig. 41.

MEASUREMENTS.

Circumference immediately below the knee.

Length from centre of knee to sole of foot.

State the age and sex of patient.

Mention to which side the foot is inclined.

The measure of the foot should be given as directed on page 14.

Kolbé's apparatus for weak ankles.

The construction of the above apparatus is similar to that of the appliances already described. It is an excellent support in sprains, and in dislocation of long standing, where the deformity is very marked. A plaster cast of the foot will be of advantage in making the apparatus.

Fig. 42.

In measuring for Fig. 42, give the circumference of limb below the knee, at the calf and ankle, around the heel, over the instep, at the toes, and length of foot.

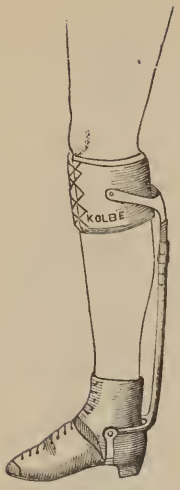
State whether the splint is to be applied to the inner or outer side; also whether for right or left leg.

The above is an illustration of a wire splint useful in the treatment of dislocations and sprains of the ankle-joint. It forms also a light and easy splint for the treatment of fractures of the leg.

Fig. 43 shows Boisnot's apparatus for dislocation of the ankle-joint, resections, &c. This apparatus explains itself, and is applicable where a continuous line of support is desired from below the knee. Exercise may be taken, and dressings applied without removal of the instrument.

Fig. 44 represents Kolbé's extension apparatus for dislocations of the ankle-joint. The apparatus is similar in construction to that shown in Fig. 41 for weak ankle, with the addition of two extension screws connected with the lateral stems, and also a regulating screw at the ankle-joint, by which talipes equinus is prevented.

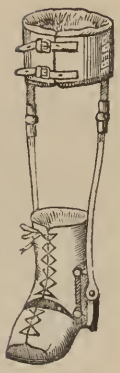
Fig. 43.



Boisnot's extension apparatus for dislocation of the ankle-joint, resections, &c.

(For measurements for these appliances, see page 18, Fig. 41.)

Fig. 44.



Kolbé's extension apparatus for dislocations of the ankle-joint.

Apparatus for Anchylosis of the Knee-Joint.

Fig. 45.

GUIDE FOR MEASUREMENTS.—Circumference of limb at D C, B A, L H, and K I. Length from E to F, and F to G. The measure for shoe to be taken as directed on page 14.

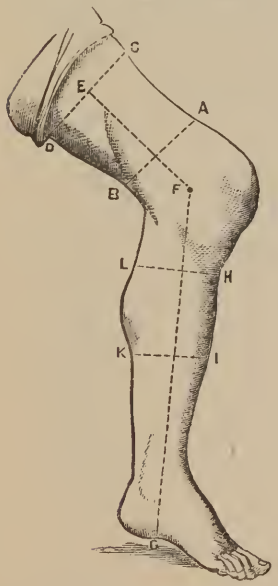


Fig. 46.

Fig. 46 shows the application of Kolbé's apparatus for anchylosis of the knee-joint. At the suggestion of Prof. Pancoast this apparatus has been modified so as to extend to the foot, thereby giving the patient additional comfort and support, and greatly facilitating walking.

Fig. 47.

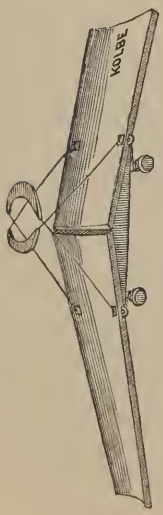
False anchylosis of knee-joint. (From photograph.)

Fig. 48.

Result after forcible breaking up of adhesions and division of hamstring tendons, with apparatus. (From photograph.)

Apparatus for Fracture of the Patella.

Fig. 49.



Boisnot's apparatus.

(See "Transactions of the American Medical Association," 1865.)

MEASUREMENTS: Circumference of thigh.

Circumference of leg.

State age and sex of patient.

Fig. 50.

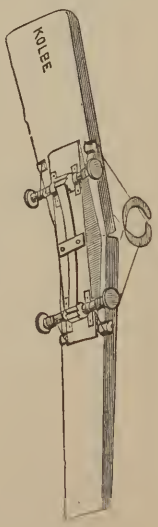
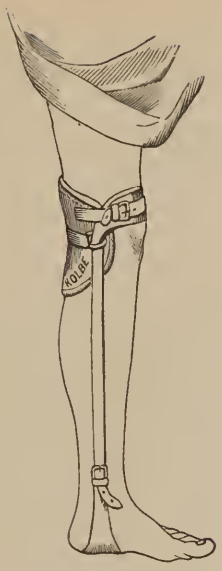
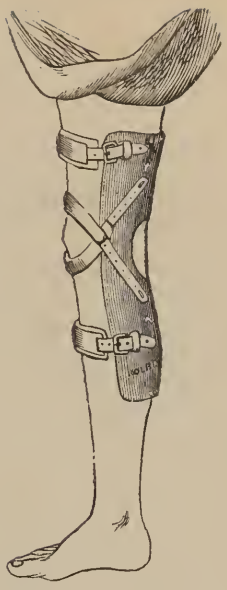


Fig. 51.



Levis' apparatus.

Fig. 52.



Hartshorne's apparatus.

Dr. Levis' apparatus (Fig. 51) consists of a strap padded where it lies above the patella. This strap is continued down the leg on each side, and is buckled to a padded stirrup-like strap, which gives a fixed point for extension from the sole of the foot. There is also a broad pad which rests behind the knee. Through a ring attached to this pad the first strap passes, and thus has its direction changed. The lower fragment of the fractured patella, having no force to displace it, is retained in position merely by a strip of adhesive plaster.

The apparatus is complete in itself, requiring no splints, and is adaptable to limbs of any size.

It is claimed that with this apparatus a patient can be well treated while walking about on crutches.

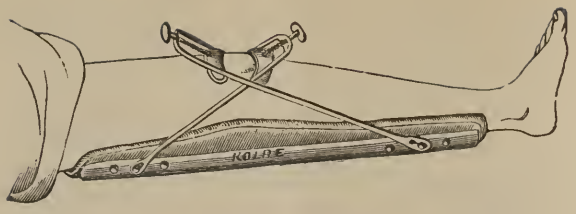
Measurements: Circumference above knee, and length from knee to sole of foot.

Dr. Hartshorne's apparatus (Fig. 52) consists of a light tin case, fitting to the limb behind, lacing in front of the thigh and the leg, and provided with straps (elastic or not, according to circumstances), which are to be applied as usual across the joint, above and below the patella, and drawn obliquely, to be fastened and tightened by means of a wedge, screw, or hooks.

Measurements: Circumference of thigh and leg.

State age and sex of patient.

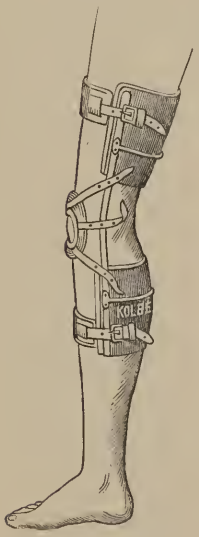
Fig. 53.



Lansdale's apparatus.

Dr. Lansdale's apparatus for the treatment of fracture of the patella consists of—1. A splint of one-inch pine board, concave at each end to receive the thigh and calf, six inches wide and eighteen inches long. 2. A muslin bag six inches square, filled with sawdust and sewed up, and tacked to the middle of the splint, to afford a firm support to the knee-joint and keep it in an easy position of slight flexion. 3. Two iron bows to button on each side of the splint near its extremities, and having a female screw in the middle to receive two thumbscrews, each operating on a semilunar pad backed with iron. 4. Across each extremity of the splint should be tacked a piece of bandage or strong tape (not represented above); these are to be brought up and tied over the thumbscrews, to prevent the pads from riding up over the patella when the screws are tightened.

Fig. 54.



Kolbé's apparatus.

MEASUREMENTS: Circumference of thigh and leg. State age and sex of patient.

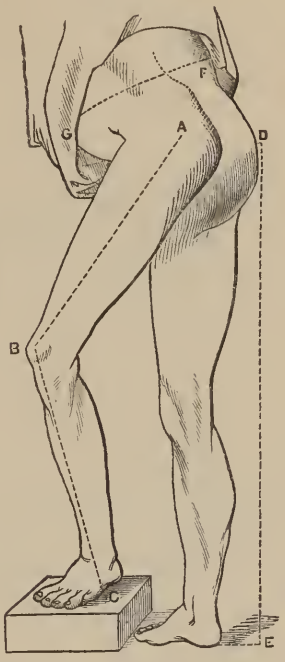
Fig. 54 illustrates Kolbé's apparatus for supporting fracture of the patella with ligamentous union. This apparatus may be safely used in cases where the fragments of the bone are separated from half an inch to an inch.

MEASUREMENTS: Circumference of thigh and leg. State age and sex of patient, and whether it is the right or left leg.

Apparatus for Coxalgia, or Hip Disease.

Fig. 55 is intended as a guide for measurement for the apparatus for hip-joint disease.

Fig. 55.



G F. Circumference of body.
A B. Length from centre of hip-joint to middle of patella.
B C. From patella to sole of foot.
D E. Length of sound limb.

Circumference above and below the knee.

State which limb is affected, the age and sex of the patient. Also a sketch or outline of the position in which the patient holds his limb is desirable.

If the apparatus in Fig. 62 or Fig. 64 is selected, it is necessary to send the measurement of the foot, as a shoe must be attached to the apparatus. The measurement for a shoe should be taken as directed on page 14.

Figs. 56 and 57 illustrate the wire splint and the mode of its application in hip disease. This splint is intended as a substitute for the carved splint. For measurements, see Fig. 55.

Figs. 58 and 59 illustrate a modification of Davis' extension splint for coxalgia, and the mode of its application by means of adhesive plaster and roller bandage. For measurements, see Fig. 55.

Fig. 60 illustrates an extension apparatus for coxalgia, devised by Dr. S. W. Gross. It can be applied by means of adhesive plaster or a gaiter, as shown in the drawing. For measurements, see Fig. 55.

Fig. 56.

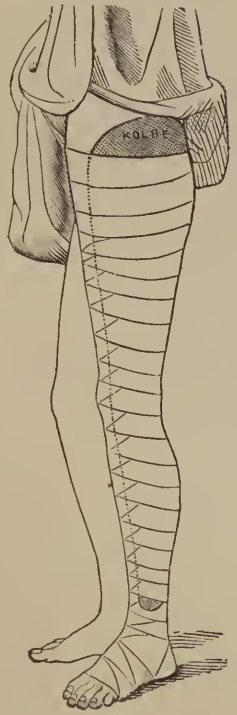


Fig. 57.

Fig. 58

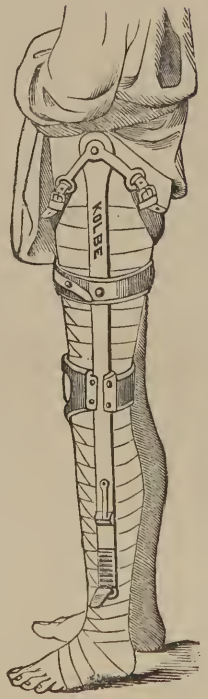


Fig. 59.

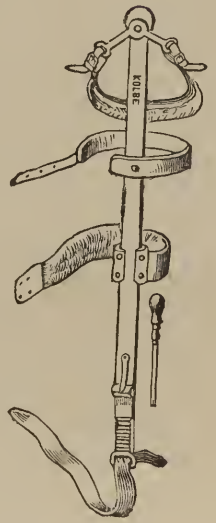
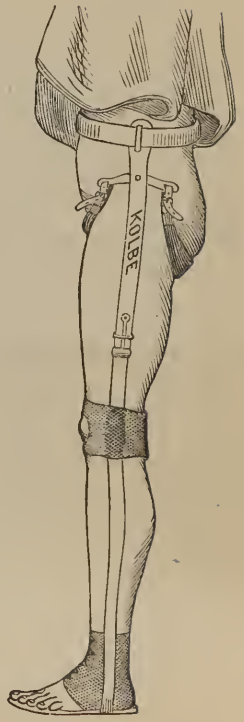


Fig. 60.



Figs. 61 and 62 illustrate an extension apparatus for coxalgia, and the mode of its application, devised by Prof. J. Pancoast. No adhesive plaster is used. For measurements, see Fig. 55, page 23.

Figs. 63 and 64 illustrate an extension apparatus for coxalgia, and the mode of its application, devised by Prof. D. H. Agnew. No adhesive plaster is used. For measurements, see Fig. 55, page 23.

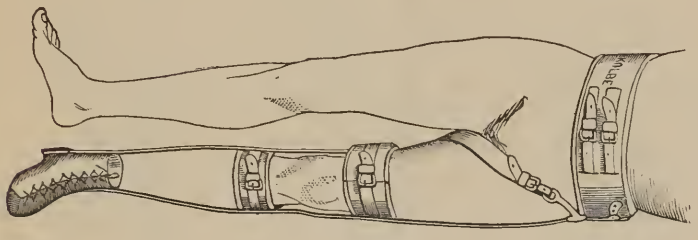


Fig. 61.

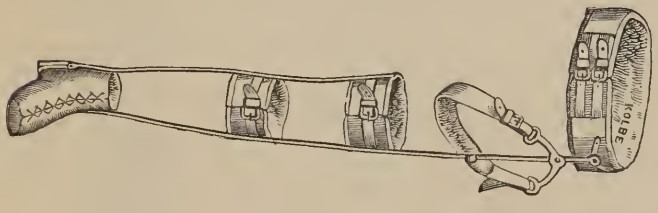


Fig. 62.

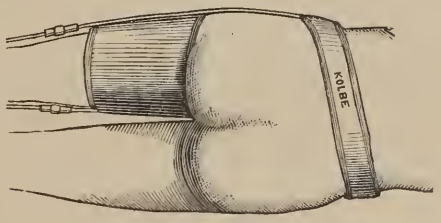


Fig. 63.

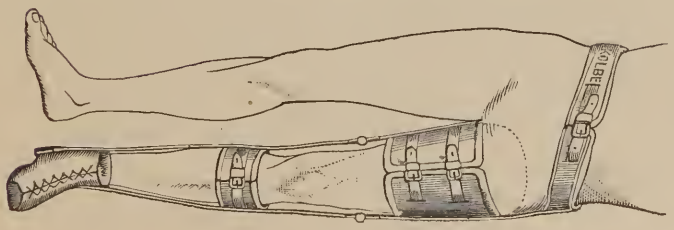
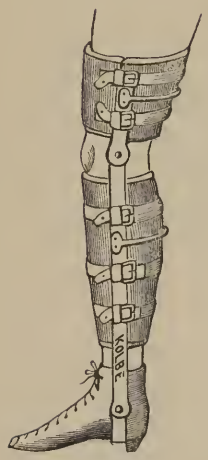


Fig. 64.

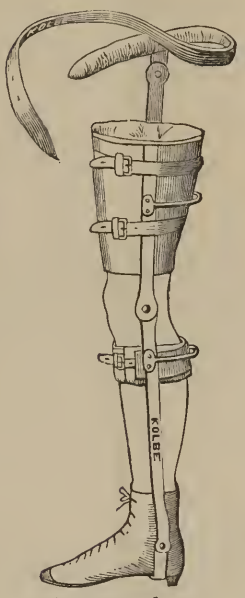
Apparatus for Ununited Fracture, Resections, and Dislocation of Hip-Joint.

Fig. 65.



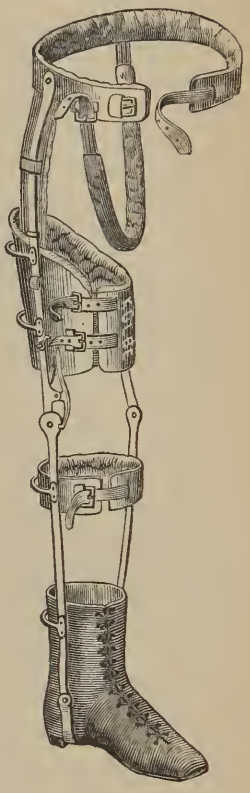
Fracture below the knee.

Fig. 66.



Fracture above the knee.

Fig. 67.



Figs. 65 and 66 exhibit the apparatus of Prof. H. H. Smith for the treatment of ununited fracture.

A similar apparatus is also an excellent support in resection of the thigh and leg.

Fig. 67 illustrates Kolbé's apparatus for dislocation of the hip-joint, ununited fracture of the neck of the femur, and resection at the upper part of the thigh.

Guide for measurement, see Fig. 69, page 28; and to point out the seat of fracture or excision of the bone, see Fig. 68, page 27.

For ununited fracture or excision of the bone below the knee, take circumference at O, N, M, K, and I; the length from R to L, and L to H.

For ununited fracture above the knee, upper part of the thigh, neck of the femur, or dislocation of the hip-joint, take circumference at M, K, I, G, and C, D; length from R to L, L to F, and F to D.

The length from R, sole of foot, to the perineum a little above the line H, should also be given.

In measuring for shoe, see page 14.

State which limb is affected, the age and sex of the patient.

Fig. 68, a drawing of the bones of the thigh, leg, foot, and a portion of the pelvis (in their normal state), is inserted in order to mark the seat of fracture or excision of the bone, which is necessary, in addition to the measurement, for the construction of the apparatus.

Fig. 68.

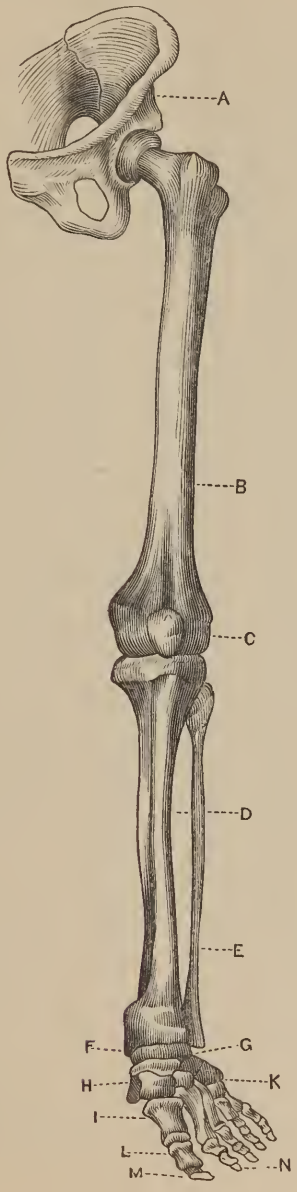
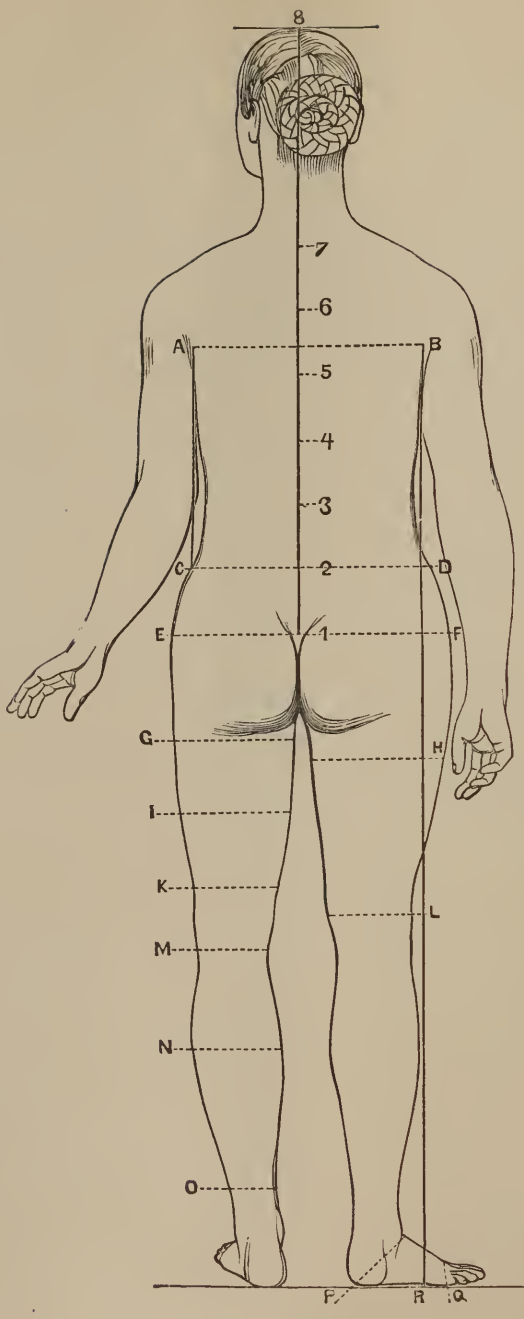


Fig. 69.



Circumference.

A. Armpit.

C. Waist.

E. Hip-joint.

G. Upper part of thigh.

I. Middle of thigh.

K. Above knee.

M. Below knee.

N. Calf.

O. Above ankle.

Length.

B. Armpit.

D Waist.

F. Hip-joint.

H. Upper part of thigh.

L. Centre of knee.

Sole of foot.

Apparatus for Paralysis.

Fig. 70 represents Kolbé's apparatus for paralysis of both limbs. It consists of lateral leg-stems, carried on the inner side as high as the perineum; on the outer, to the pelvic band or to the armpit, as the case may require. Joints are placed at the hip, knee, and ankle, and are secured to the body by the pelvic, thigh, and leg bands. If the patient has not sufficient strength to maintain the erect position, the apparatus is provided with a contrivance to lock the knee, and, if necessary, also the hip-joint. In some cases it is preferable to attach elastic straps to the back of the pelvic band, running downward over the posterior surface of the thigh, to the back part of the thigh-band, which will give the hip-joint an artificial muscular extension to hold the patient in an erect position, while it will allow a more free motion in walking. When the patient is lying down or sitting, the joints may be relaxed or unlocked, to permit free flexion.

Fig. 72 represents Kolbé's apparatus for paralysis of one limb. Its construction is the same as that shown in Fig. 70.

Both these apparatuses should only be employed in cases where the patient has lost its entire control over the hip-joint.

Figs. 73, 74, and 75 illustrate Kolbé's apparatus with spring joints, by which the patient is enabled to flex the knee in walking; the deficiency of the muscular power being supplied by the elasticity of the joints. Either of these apparatuses is applicable, in fact preferable, in cases where the patient has but slight control over the hip-joint. Fig. 75 represents the last modification.

Fig. 76 illustrates Kolbé's apparatus for one or both limbs, with spring lock at the knee-joint. This apparatus is principally applied in cases where the entire control of the knee and ankle-joint is lost.

GUIDE FOR MEASUREMENTS.

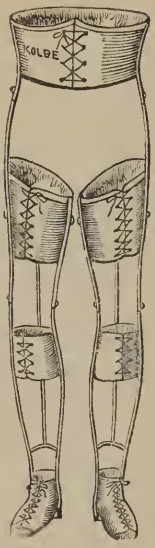
(See Fig. 69, page 28.)

R L. Length from sole of foot to centre of knee.
L F. Length from centre of knee-joint to hip.
F B. Length from hip-joint to under the arm.
M. Circumference below the knee.
K. Circumference above the knee.
I. Circumference of middle of thigh.
C D. Circumference around the waist.
A B. Circumference under the arm, if requisite.

Measure for shoe as directed on page 14.

State the age and sex of the patient.

Fig. 70.

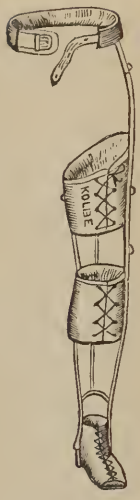


Apparatus for paralysis of both limbs, with the pelvic band.

Fig. 71.

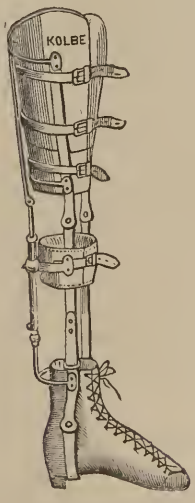
Paralysis with apparatus. (From photograph.)

Fig. 72.



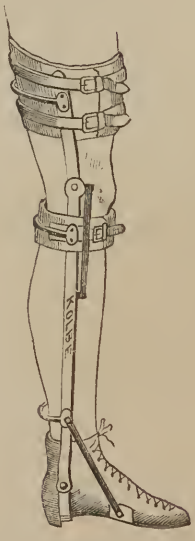
Apparatus for paralysis of one limb, with pelvic band.

Fig. 73.



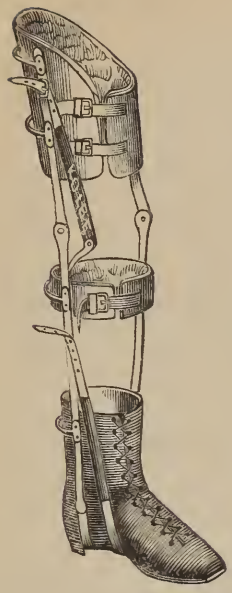
Apparatus for paralysis for one or both limbs, with spring joints at the knee-joint.

Fig. 74.



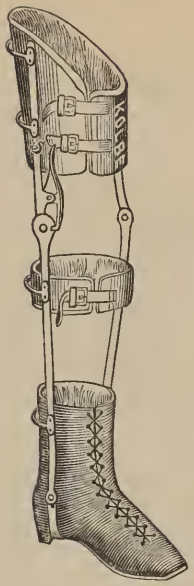
Apparatus for paralysis for one or both limbs, with spring joints at the knee and ankle-joint.

Fig. 75.



Apparatus for paralysis for one or both limbs, with elastic extension at knee and ankle-joint.

Fig. 76.



Apparatus for paralysis for one or both limbs, with spring lock at the knee-joint.

Fig. 77.

Partial paralysis of both limbs, with contraction of legs and feet, and malformation of tarsal bones. (From photograph.)

Fig. 78.

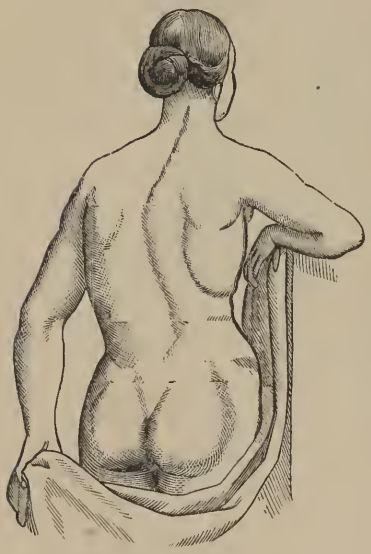
Result after the division of tendons, with apparatus applied. (From photograph.)

APPARATUS FOR DEFORMITIES OF THE TRUNK.

CURVATURES OF THE SPINE.

Apparatus for Lateral Curvature of the Spine.

Fig. 79.



Showing the deformity.

In ordering an apparatus for lateral curvature of the spine, the following measurements are necessary.

(See guide for measurements, Fig. 69, p. 28.)

A B.
C D.
E F. } Points of circumferential measurements of the body.

A C.
B D. } Distances between the highest and lowest body measures, extending from the armpits or axillas to the points of the hips.

In addition to the above measurements, state to which side the body inclines (right or left), the age and sex of the patient.

Fig. 80.

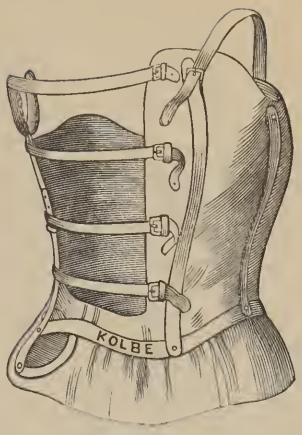
Application of apparatus

Fig. 81.

Application of apparatus.

Fig. 80 represents Kolbé's apparatus for lateral curvature. It consists of a steel frame well padded with leather or other appropriate material. The power is applied by means of screws and ratchet centres.

Fig. 82.



Figs. 81 and 82 illustrate the construction of another form of Kolbé's apparatus. It consists of a steel frame, padded as in the former case. The power is applied by means of free centres and elastic or inelastic straps. It serves a double purpose for young ladies, for, while supporting the lateral curvature, it also takes the place of the ordinary corsets. This apparatus is preferable for both male and female.

Apparatus for Antero-Posterior or Angular Curvature (Pott's Disease).

In ordering an apparatus for angular curvature of the spine, the following measurements are necessary.

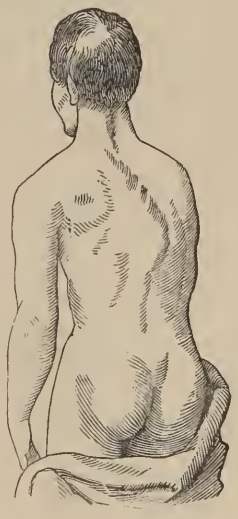
(See guide for measurements, Fig. 69, page 28.)

A B.
C D. } Circumferential measures.
E F.

A C. } Distances between the highest and lowest body measures, extending from the armpits or
B D. } axillas to the points of the hips.

Length from mark 1, horizontal line E F, to the centre of curvature, on perpendicular line.

Fig. 83.

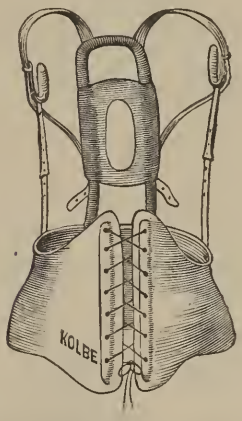


Showing the deformity.

In all cases of this deformity it will be necessary to take the outline of the dorsal protuberance, which may be readily obtained by placing the patient in a horizontal position on his face, and then applying a strip of sheet-lead, lead wire, or pasteboard cut edgewise, along the median line over the apex of curvature, and extending from 1 to 7 on the perpendicular line. This will give a curved outline, which may then be marked off on a sheet of paper. The age and sex of the patient will also be required.

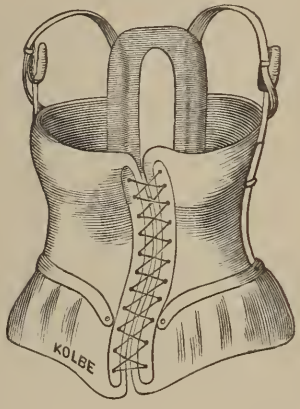
Figs. 84 and 85 represent Kolbé's apparatus for antero-posterior or angular curvature. It consists of a light steel frame, well padded. The bearings or points of support are established on the hips by the pelvic belt, from which runs, on either side of the spine, a support provided with soft cushions, and connected by means of straps with the lateral crutch-shaped support, which is intended only to steady the support on the back. This apparatus fully provides for the necessary rest of the spine sought by confining the patient to the bed.

Fig. 84.



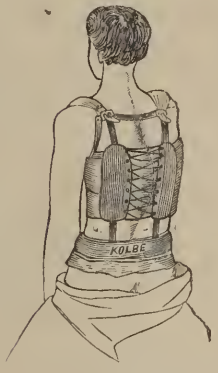
Apparatus for children and adult male patients.

Fig. 85.



Apparatus for adult female patients.

Fig. 86.



Application of apparatus.

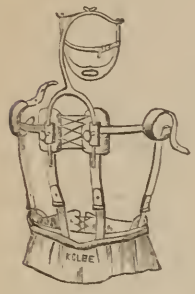
Fig. 87.

Fig. 87 shows the old form of a spinal supporter. It consists also of a light steel frame well padded, which takes its support on the pelvis, and supports the upper part of the body by axillary crutches. It is an imperfect support, and cannot be relied on.

Apparatus for Cervical Curvature.

Fig. 88 shows Kolbé's modification of an apparatus for cervical curvature, and Fig. 89 illustrates the mode in which it is applied.

Fig. 88.



In ordering the above apparatus, the person will be guided by the same measurements as are given on page 33, angular curvature, with the addition of the distance from the line E F to the top of the head, mark 1 to 8.

This instrument may also be employed in slight cases of wry-neck. It is similar in construction to the apparatus employed for the treatment of angular curvature in the dorsal region; the cephalic lever is movable, and in slight cases of distortion it may be detached from the body of the apparatus during the time the patient walks abroad.

Fig. 89.

APPARATUS FOR DEFORMITIES OF THE HEAD AND NECK.

WRY-NECK.

Figs. 90 and 91 show Kolbé's apparatus for wry-neck, and Fig. 92 an apparatus for the same purpose, modified and improved

Fig. 90.

Apparatus for wry-neck.

Fig. 91.

Showing the mode of application of the apparatus.

Fig. 92.

Showing the application of the apparatus modified by Kolbé.

Fig. 93.

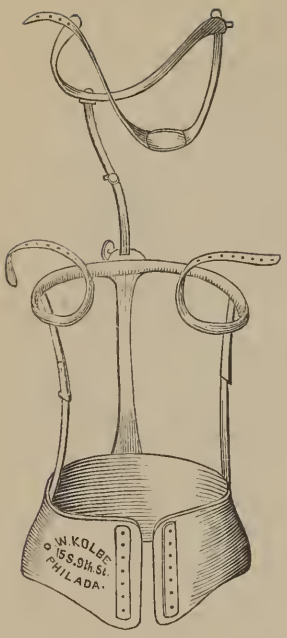


Fig. 94.

Fig. 93 shows Kolbé's apparatus for wry-neck, as last improved.

Fig. 94 illustrates the mode of supporting the head, which also is applicable in cases of cervical curvature.

The above forms of apparatus for wry-neck take their bearings or point of counter-extension upon the pelvis, instead of the shoulders, as in the ordinary collar apparatus, and they are therefore stable, without the slightest tendency to become displaced. The rotative force applied to the head by the two cephalic levers admits of graduation by means of ratchet centres, as seen in the cuts.

In ordering an apparatus of the sort, the measurements given on page 35 will be required. A sketch or photograph showing the extent of contraction will be desirable, and assist greatly in making a well-fitting apparatus.

Fig. 95.

Figs. 95 and 96 show the application of shoulder-braces. It will be simply necessary, in ordering these, to mention the age and sex of the patient.

Fig. 96.

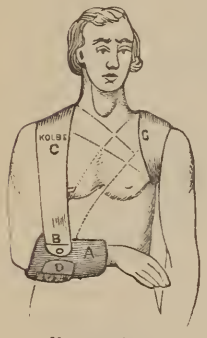
APPARATUS FOR DEFORMITIES OF THE UPPER EXTREMITIES.

FRACTURES.

Apparatus for Fracture of the Clavicle.

The apparatus represented in Figs. 97 and 98 (front and back views) is that devised by Dr. Boisnot. It consists of a leather forearm tray, A, lacing and made to fit the parts well. To the upper and outer part of this tray a stout piece of leather is attached, freely movable; this part is again extended by the addition of two yards of stout webbing, C C, which, after coursing around the chest in the manner shown in the cut, is finally attached to the tray by the buckle D, thence to sound shoulder for sling.

Fig. 97.



Front view.

Fig. 98.

Back view.

In ordering this apparatus no measurements are required, but simply the age and sex of the patient.

Figs. 99 and 100 show the apparatus of Dr. Levis. It consists of a short, firm pad in the axilla, by which the shoulder is held from the side and over which, as a fulcrum, the elbow is drawn to the side. To

Fig. 99.

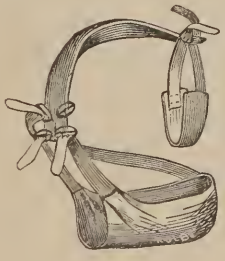


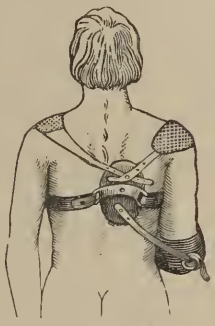
Fig. 100.

the front and back of the axillary pad are fastened straps, which pass directly upwards, and are buckled to a wide main supporting band, which passes from the shoulder across the upper part of the back, and over the shoulder of the sound side, and terminates on the front of the chest. To the front end of the wide supporting band is suspended a sling, by which the elbow is supported. On the back of the sling, at a short distance above the point of the elbow, a strap is attached, which passes obliquely across the back, and, coming in front, is buckled to the main supporting band. The extra buckle, which will be noticed at the front end of the wide band, comes into use when the apparatus is reversed for the opposite shoulder.

Fig. 101.

Front view.

Fig. 102.



Back view.

Figs. 101 and 102 illustrate the apparatus for fracture of the clavicle as designed by Dr. Edward Hartshorne. This differs from the preceding in having a compress placed upon the lower and inner margin of the scapula of the injured side.

In ordering this apparatus, no measurement is required. State the age and sex of the patient.

Fig. 103 shows Kolbé's modification of one of Stromeyer's splints for anchylosis of the elbow. Other forms of the apparatus are made, in which the regulating screw is so placed as not to materially interfere with the patient's clothing. In measuring for this apparatus, give the circumference of the arm above and below the elbow, and also the length from the wrist to the elbow, and from the elbow to the armpit.

Fig. 103.

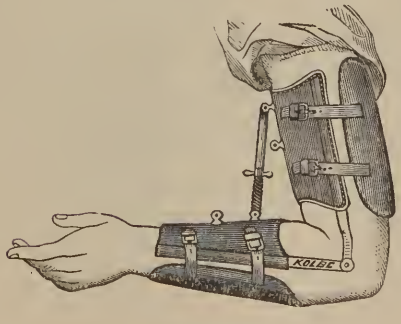
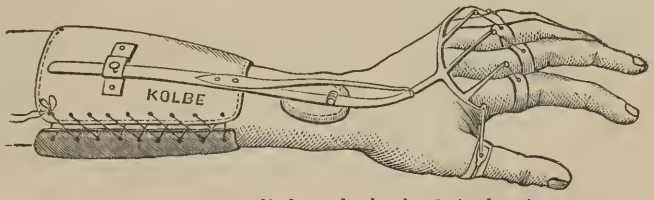


Fig. 104.

Paralysis of the extensors of the hand.

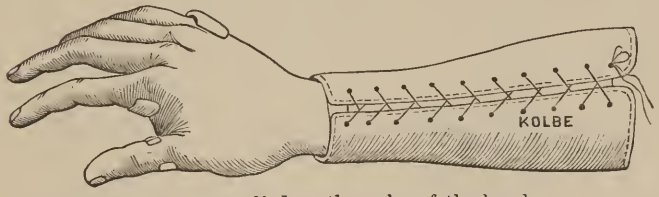
Figs. 105 and 106 illustrate Kolbé's modification of Duchenne and Delacroix's apparatus for paralysis of the extensors of the hand.

Fig. 105.



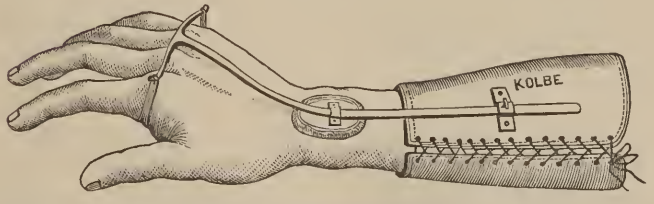
Apparatus applied on the back of the hand.

Fig. 106.



Apparatus applied on the palm of the hand.

Fig 107.



Apparatus devised by Dr. S. W. Gross, to overcome, by elastic extension, contraction and false anchylosis of the wrist-joint.

In measuring for these apparatuses, give the circumference of the arm below the elbow, and the length from the wrist to the elbow. Place the arm and hand on a sheet of paper and draw a line around them, to obtain their contour.

Apparatus for Resections.

Fig. 108.

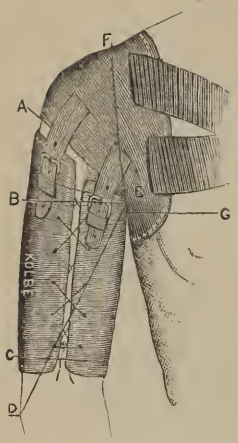


Fig. 108 shows Kolbé's apparatus for resections at the shoulder-joint and in the continuity of the humerus. In ordering this apparatus, mark the seat of the resection; give the circumference of the shoulder, and of the chest just under the armpits; the distance from the armpit to the elbow. State whether it is the right or left arm for which the apparatus is intended.

Fig. 109.

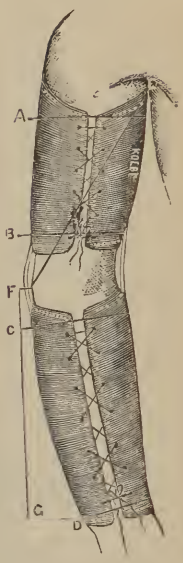


Fig. 109 shows Kolbé's apparatus for resection of the forearm. It will be necessary, in ordering this apparatus, to give the circumference of the arm at the armpit, above the elbow, below the elbow, and at the wrist. State also the length from the wrist to the elbow-joint, from the elbow-joint to the armpit, and whether it is the right or left arm.

Fig. 110.

Resection of the humerus.
(From photograph.)

Fig. 111.

Apparatus applied.
(From photograph.)

Abdominal Supporter and Trusses.

Fig. 112.

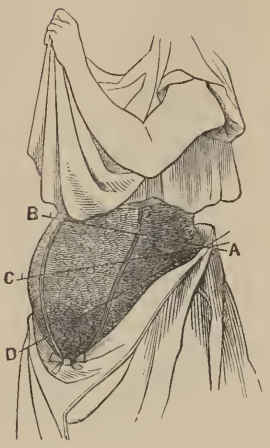


Fig. 112 illustrates the application of an elastic abdominal supporter in pregnancy and large tumors of this region. In ordering this bandage, simply give the circumference of the abdomen in the directions of the lines A B, A C, and A D.

We keep on hand a large assortment of other forms of abdominal and uterine supporters, and manufacture to order any pattern which may be desired by the surgeon.

Fig. 113 shows the plain French pattern truss, which is in many cases preferable to the more complicated truss. A large assortment of other trusses and suspensory bandages is kept constantly on hand.

In taking measurement for such an instrument, give the circumference of the body at the point where the hernia protrudes—that is, on a level with the inguinal, crural, ventral, or umbilical apertures; and also mention if the hernia is on the right or left side, or both.

Fig. 113.

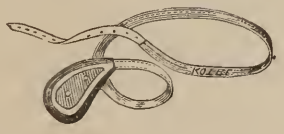
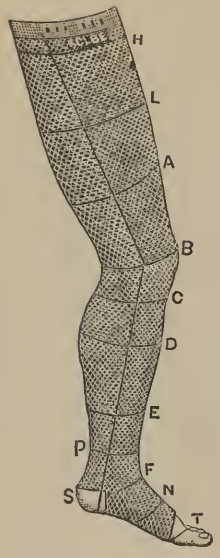


Fig. 114.

Fig. 114 shows a spring truss for prolapsus ani, or falling of the body. In ordering the instrument, give the circumference of the body above the hips, and the distance from the front central point of this line, over the perineum, to the centre of the back part of the line.

Fig. 115.



Elastic Stockings.

A combination of vulcanized rubber, webbing, silk, or cotton, used in the treatment of varicose veins, ulcers, and swelling of the legs. In measuring for stockings for the entire leg, give the circumference at the points shown in the illustration. For parts of the leg, as follows :—

Ankle Stocking.—Circumferences from T up to E.

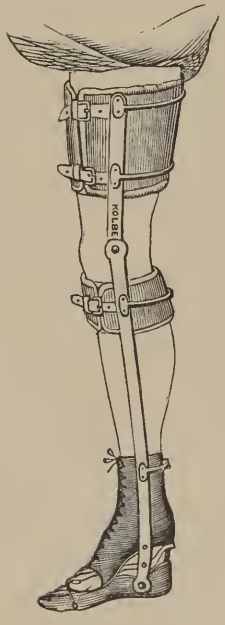
Leg Stocking.—Circumferences from T up to C.

Stocking for above the Knee.—Circumferences from T up to A.

For the Knee-Cap (only).—Circumferences from C up to A.

In all cases the length should be given from the sole of the foot to the point to which the stocking is to extend.

Fig. 116.



Artificial foot with support above and below the knee.

Apparatus for Shortened Limbs.

GUIDE FOR MEASUREMENTS.

Circumference above knee.

Circumference below knee.

Circumference around ankle.

Circumference around instep.

Length from patella to sole of foot.

The difference in length between sound and defective limb.

Place the foot on a sheet of paper and draw a line around it, to obtain its contour.

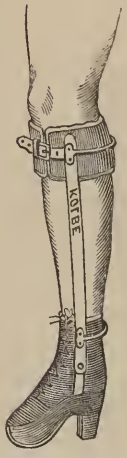
State which limb, the age and sex of the patient.

Apparatus for Shortened Limbs.

Fig. 117.

Artificial foot with support below the knee.

Fig. 118.



Cork shoe with support to the ankle-joint.

Figs. 116 and 117 illustrate Kolbé's apparatus to supply the deficiency of a shortened limb, caused by hip-joint disease, resection, &c. A boot or laced shoe is worn over the natural and artificial foot, which conceals the deformity.

Fig. 118 illustrates an apparatus, less expensive, for the deficiency of a shortened limb. It consists of a shoe provided with cork between the sole and shoe, to which is attached a support, to guard against spraining the ankle, which is more or less unavoidable by the use of a high cork shoe alone.

Fig. 119.

Fig. 119 represents a wooden pin, or "box-leg." It consists of a wooden frame widely grooved below, to accommodate the knee, and of four lateral side-pieces; the external, slightly curved backward, reaches from the knee to the crest of the ilium, and the internal half-way up to the thigh. From the bottom of the socket a pin projects, and makes up the interval between the knee and the ground.

ARTIFICIAL LIMBS

Invented and Manufactured by

D. W. KOLBÉ.

Approved and commissioned by the Surgeon-General of the U. S. Army.

In addition to the public in general, they are furnished to officers, soldiers, and sailors of the Army and Navy of the United States, under an act of Congress approved June 17 and 30, 1870, and bond has been given, according to the requirements of the act, for the faithful performance of our duty to those who may favor us with their patronage.

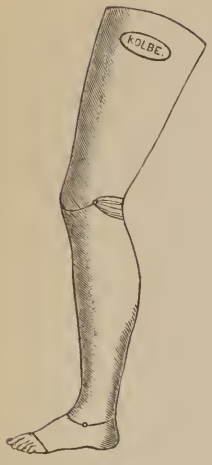
As a guarantee to our patrons of our capability to give entire satisfaction I need only to call attention to the fact that I have made a specialty of this branch of the art for the last thirty-three years. Ten years were spent in the most celebrated workshops of Germany, Belgium, and Paris, and twenty-three years in the United States. In this period we have gained the confidence and patronage of the leading surgeons in this country, who have testified their appreciation of our efforts by permitting their names as reference, and referring to us in terms of commendation in their works on surgical science.

These warm testimonials to our labors have rendered it entirely useless for us to follow the now antiquated and absurd custom of presenting any array of testimonials from the wearers of our limbs as to their efficiency. This question has been definitely settled by the appointment of boards of surgeons by the army authorities, and by civil practitioners, whose decisions as to the relative merits of our limbs have been sufficiently gratifying and encouraging to lead us to believe that those needing them will be influenced in their choice by professional experts who have devoted years to the study of this branch of mechanical surgery. We simply ask, therefore, those who desire artificial appliances —limbs, apparatus for deformities, &c.—to call at our store and examine the limbs themselves. The comparison can then be made between our work and that of other manufacturers. We regard this rather to be the crucial test of superiority than general impressions of uninformed persons.

I propose to present first the cuts of our limbs for amputation above the knee and below the knee.

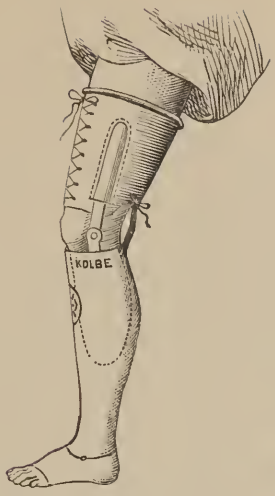
In Fig. 120 is shown the complete limb for amputation above the knee. It is the best appliance that has as yet been devised for supplying the loss of the natural member. Its action is in perfect imitation of the functions of the natural limb, and this is effected in the most simple manner, as shown in Fig. 122.

Fig. 120.



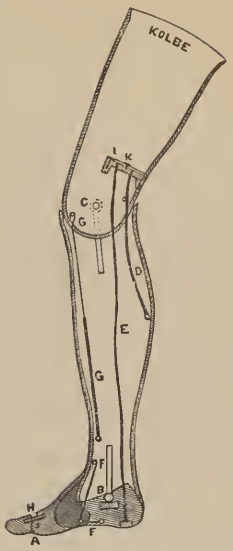
Kolbé's limb for amputation above the knee.

Fig. 121.



Kolbé's limb for amputation below the knee.

Fig. 122.



Vertical section of perfect limb.

As is usual, the framework is of willow wood, which is selected for its tenacity, strength, and fine grain, and is covered with rawhide (specially prepared for that purpose); its external appearance is of a flesh-color, waterproof enamelled; the thigh-piece, or bucket, fitting the thigh accurately, and extending up to the ischium and perineum, which sustains a part of the weight of the body, the balance being diffused over the outer surface of the thigh. Its walls are opened by oblong slits or fenestræ, which permit a due amount of ventilation, and at the same time allow the secretions of the part to escape. The thigh-piece is strongly articulated at the knee to the leg-piece by a steel bolt, which permits antero-posterior motion only. From the inner surface of the lower third of the bucket a wooden pin, I K, projects, to which are attached two strong cords made of twisted linen thread. One of these, I E, being inserted into the heel, represents the tendo Achillis; it supports the weight of the body by preventing the foot being bent at any greater angle than a right angle. The other cord, K D, is inserted into the middle of the posterior surface of the leg, and is accessory to the former, an arrangement by which the limb is rendered so exceedingly strong that the weight of the strongest man cannot injure its stability. The cord marked G G is a spring which is intended to give the leg a slight impulse forward in taking a step; it is the analogue of the extensor quadriceps of the natural limb.

Fig. 123 shows the mechanism of the ankle-joint. It is somewhat peculiar, combining all the strength of a ginglymoid joint with lateral motion. The inferior surface of the leg and the corresponding surface of the foot are provided each with a hemispherical depression, which, when conjoined, form a hollow sphere; in the interior of this sphere the globular enlargement seated at the centre of the steel ankle-bolt works, the extremities of the bolt passing through the lateral metal straps in holes a little larger than their diameter; these extremities are sustained by two pieces of India-rubber, which permit the amount of lateral motion desirable in the ankle. F F, in Fig. 122, indicate the position of a cord attached to a horizontal spring fastened to the sole of the foot, and intended to bring the foot again to a rectangular position with the leg after it has been extended; it is the analogue of the tibialis anticus. H A mark the metatarso-pharyngeal joint; it is a simple tenon and mortise joint, firmly bolted together, and under the control of a spring which brings the toes straight with the foot after they have been extended by the weight of the body.

Fig. 123.

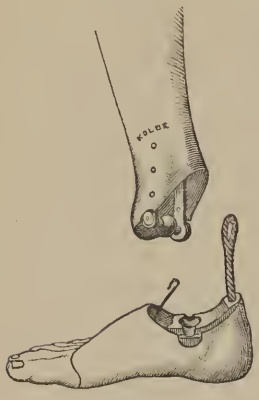


Fig. 124.

Amputation through knee and leg.
(From photograph.)

Fig. 125.

Artificial limbs applied.
(From photograph.)

The artificial leg, Fig. 121, for amputation below the knee, is constructed in the same substantial manner as above described. No artificial means are needed for the antero-posterior motion of the knee-joint.

We shall now present, by way of illustration, selected from a large number, the drawings of two cases in which our limbs were used with perfect success.

Fig. 124 shows a patient with both legs removed, one through the knee and the other below. The stumps were of peculiar form and unusually tender, being surrounded with cicatrices caused by sloughing.

Fig. 125 is the patient with the limbs applied.

Fig. 126 shows a young man who had both legs cut off below the knee, and who for fifteen years crawled along on knee-pads, in consequence of which the knees were deformed and contracted, the stumps had undergone sloughing, leaving the end of the bones projecting and barely covered with skin, as represented in the cut.

Fig. 127 shows the patient with the limbs applied.

The success in both these cases was as complete as it was surprising, and left nothing desirable that art could supply.

For further confirmation of the perfect adaptability and superiority of our limbs, I shall quote an extract from Wales's *Mechanical Therapeutics*, a work the reputation of which is thoroughly established in the

Fig. 126.

Amputation through both legs.
(From photograph.)

Fig. 127.

Artificial limbs applied.
(From photograph.)

medical profession. He says that "Kolbé, of Philadelphia, has devised a leg in many respects superior to that of others. It possesses slight lateral motion at the ankle, enough to relieve the strain upon the thigh-sheath when the person steps upon an irregular or an inclinal surface; while, at the same time, it does not render the walking unstable, as it must do if too great an amount of motion is given to the ankle. The external finish and strength of the limb give it rank with the best automatic appliances now offered for the patronage of the maimed, and one great recommendation it possesses is that it may be adapted to every form or length of stump. Its mechanism is so simple that the wearer

Fig. 128.

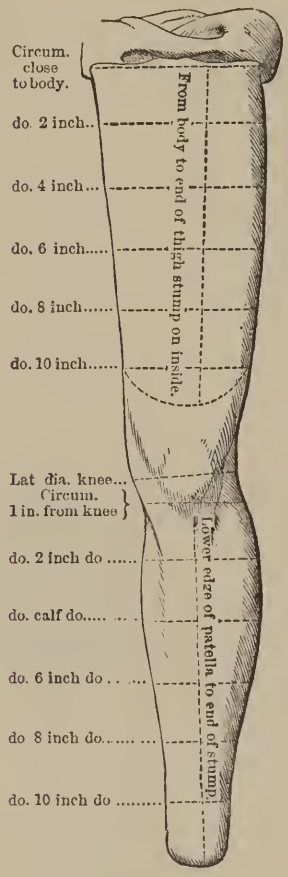
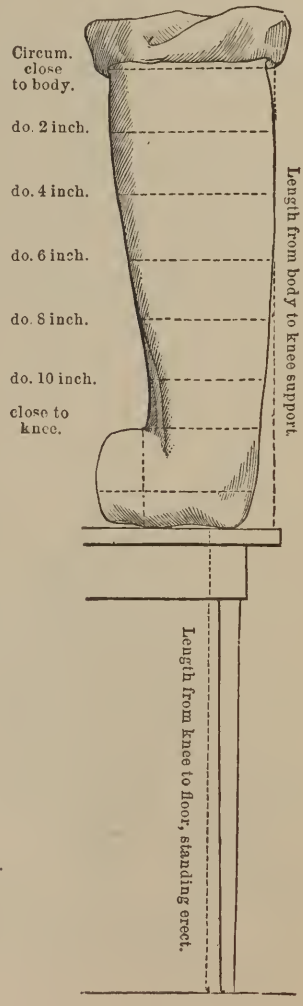


Fig. 129.



of the limb can in general be his own repairer, should any portion of it give out or need overhauling, and this is no small advantage to persons residing at a distance from the manufacturer.

DIRECTIONS FOR MEASURING FOR ARTIFICIAL LEG.

Fig. 128 is intended for measuring the stump above the knee and below the knee.

Fig. 129, for measuring stump in amputation at or immediately below the knee.

Fig. 130, for measuring sound limb in flexed position when amputation is performed above the knee.

Fig. 131, for measuring sound limb in either amputation.

1. In measuring, draw the tape moderately tight.

2. The limb should be bare, and the patient must stand erect, with the hips level, while the measures in Fig. 131 are taken.

3. The patient must be seated while those in Fig. 130 are taken, and bear no weight on the foot.

4. For amputation below the knee, when the patient cannot visit the manufactory, it is desirable to have a plaster cast of the end of the stump to about six inches above the knee-joint.

5. State age and sex of patient; which leg amputated; whether well healed and joint flexible; weight of the patient; occupation; and whether a false limb has been worn before.

6. For size of foot, let it rest on a sheet of paper and draw a pencil-mark around it, to obtain its contour.

Fig. 130.

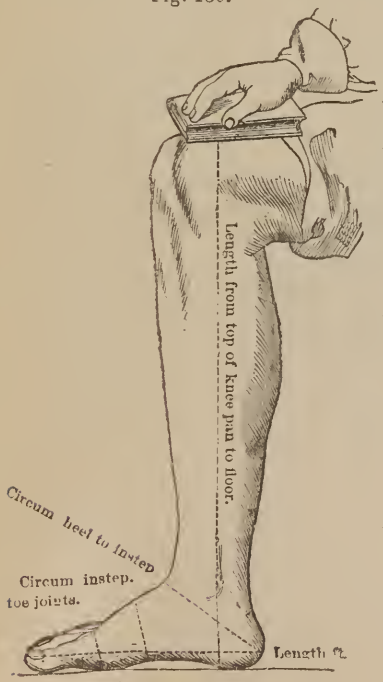


Fig. 131.

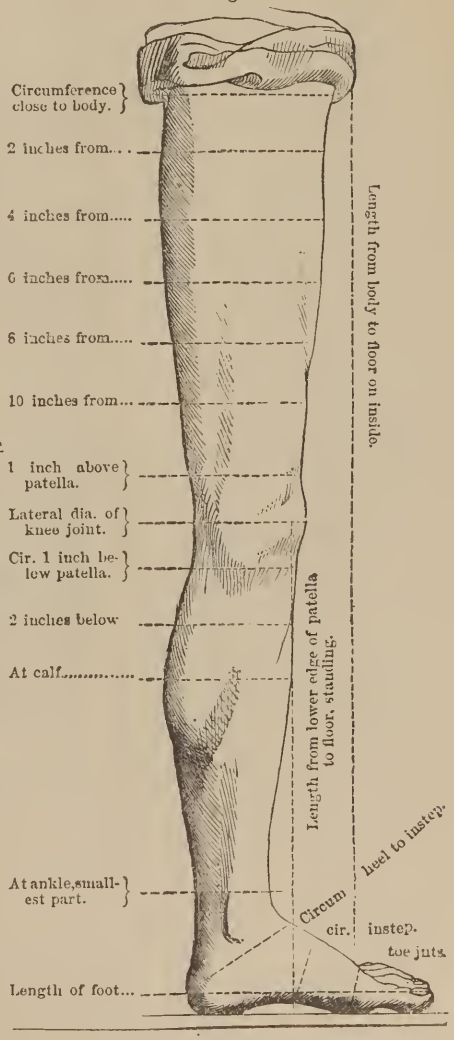
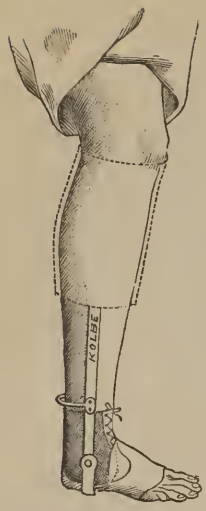


Fig. 132.



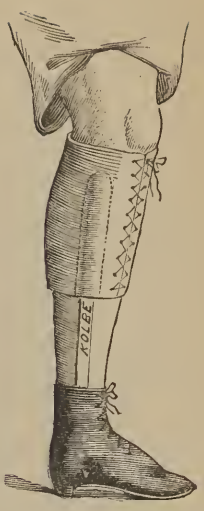
Artificial foot with support below the knee.

Figs. 132, 133, 134, and 135 illustrate Kolbe's artificial foot, used after Syme's, Chopart's, Hey's, and Pirogoff's operations.

The perfection attained in the construction of this peculiar artificial substitute has overcome the numberless objections made against the above-named operations. It as fully supplies the important necessity of comfort in locomotion, etc., as can be expected of any other artificial limb when amputation is performed anterior to the insertion of the flexors of the foot.

In many cases the artificial foot as represented in Fig. 134 is preferable.

Fig. 133.



Artificial foot with shoe applied.

Fig. 134.

Artificial foot without support taken from the knee.

Fig. 135

Artificial foot with shoe applied.

Fig. 136.

Stump.

GUIDE FOR MEASUREMENTS.

Length from lower edge of patella to end of stump.
Circumference below knee.

A plaster cast extending a little above the ankle, showing the deformity, should be taken. Also the length of the sound limb from the lower edge of the patella to the sole of the foot, and the outline of the foot, should be given.

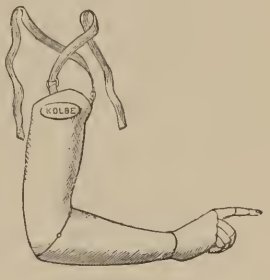
DESCRIPTION OF KOLBÉ'S ARTIFICIAL HAND AND ARM

FOR AMPUTATION AT THE SHOULDER, ABOVE AND BELOW THE ELBOW, AND AT THE WRIST.

Approved and commissioned by the Surgeon-General's Circular Order, May 13, 1865, *and furnished (by special contract, Jan.* 28, 1867) *to the maimed of the State of Georgia.*

This is the only combination of the dress and stump arm yet invented, and will be found to combine, in an unusual degree, the advantages of both. The arm and hand together form a perfect imitation of the natural limb, while its usefulness in daily occupation is unequalled.

Fig. 137.



The following drawings are intended to illustrate the outward form and the mechanism of motion of the artificial arm. It can be adapted to stumps of any length.

Fig. 137 shows the arm complete for an amputation above the elbow. It performs the various functions of the upper extremity, as flexion, extension of the elbow, moving and grasping of the fingers.

Fig. 138 represents an arm for amputation below the elbow and at the wrist-joint; its motions are the same as in the previous case. This arm is of great service in farming, driving horses, and for laboring men in general, as I have so modified the connection of the hand with the forearm that the former may be removed at pleasure, and various useful contrivances substituted, such as a chisel, screwdriver, knife, fork, or spoon, etc., or indeed any tool or implement which the wearer may find useful in his daily occupation.

Fig. 138.

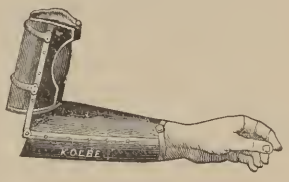
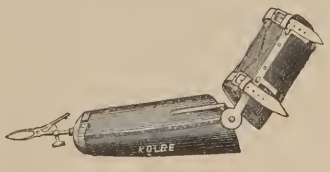


Fig. 139 shows the hand detached, and Fig. 140 the hand replaced by

Fig. 139.

Fig. 140.



a pair of nippers. The form of the arm is made of leather (specially prepared), and mounted with steel strips. The socket receiving the stump has an agreeably soft feeling, and can be applied to the most tender stumps. The application of power is provided for, in the construction of these limbs, by the following mechanism: A traction-cord, consisting partly of webbing and partly of a well-tempered slip of steel, is attached above by the webbing to the shoulder from the arm opposite that which the artificial substitute is intended to replace, and below hooks on, by the end of the metallic portion of the cord which runs about the forearm, to a short vertical steel slip running through a slit in the back of the margin of the wrist-plate; thus connecting it with the mechanical arrangements designed to move the fingers, which I shall briefly describe.

The strip of steel at the level of and upon the outer side of the elbow is articulated with the aid of a metal slide working for its whole length upon a tenon or projecting pin; the upper end of the slide is connected to the webbing or leather strap going to the shoulder: the object of this arrangement is to change the direction of the force when the arm is bent. The mechanical arrangement for moving the fingers is inclosed in a cavity hollowed in the substance of the hand, as shown in Fig. 141 It consists of a number of levers of different kinds, arranged in such a manner as to apply the force exercised by the traction-cord to the best mechanical advantage in moving the fingers. From the end of the long arm of the second lever a bar projects upwards to the extent of an inch and a half, and connected by a short coupling, by its proximate end, to an oblique bar fixed to the base of the thumb. A spiral spring runs along each side of the hand, and, acting upon each couple of fingers, keeps them in a position of approximation to the thumb. The fingers are connected with the hand by a transverse bolt; the index and middle fingers, and the ring and little fingers, are coupled together, possessing the first phalangeal joints. As the mechanism thus far described provides only for the extension of the first phalanges, an additional lever, working by an excentric, is placed in the first phalanges, and acts upon the second and third phalanges.

Fig. 141.

The entire mechanism of the hand and arm being of steel, it is not subject to the variations of the atmosphere, as is the case with catgut and similar substances so often employed by others. In warm weather these relax, and control of the hand and arm is almost entirely lost; while in wet weather these substances extract the moisture of the atmosphere and swell, thereby preventing free action of the parts. Owing

to these constant changes from atmospheric causes, these materials soon wear out, and the limb becomes more or less useless. By using steel (which is free from these objections), strength, lightness, durability, freedom of motion, and non-liability to atmospheric changes are secured.

The following is an extract from a report of a medical committee on the above described arm:—

His Excellency Charles J. Jenkins, Governor of Georgia:

By a resolution of the General Assembly of the State of Georgia, entitled "A resolution for the relief of soldiers maimed in the State or Confederate States service, and now resident in this State," assented to November 29th, 1866, the undersigned were appointed a committee to make an examination into the professional merits of "the Kolbé arm," and to report the same to his Excellency the Governor.

In pursuance of said resolution, the committee had the honor, on due deliberation, to present their report relating to "the Kolbé arm."

With a conscientious recognition of the responsibility trustfully imposed upon them, the undersigned committee have entered faithfully into the investigation of the structure, material, plan, and mechanism of "the Kolbé arm," as applicable to both humeral and cubital stumps, comparing it with other implements of a like character, and they further respectfully report that the limb under consideration possesses, by its lightness, strength, simplicity of construction, durability, and efficiency, many advantages over any others that they have examined.

They would call particular attention to the distinguishing peculiarity of this arm, viz., that while it presents all the desirable qualities attaching to the best models of the ordinary "dress arm," it possesses the great advantage of a movable hand, which particular feature in its construction enables the wrist-end to be converted into a socket for the attachment of any and every variety of tool or instrument that the ingenuity of the mutilated person may devise for his convenience and use. This advantage is illustrated in the hook furnished with each of the arms, to be applied, under the provision of the General Assembly's resolutions, in case the arm under consideration be adopted.

Most respectfully submitted by the committee under resolution of the General Assembly of the State of Georgia.

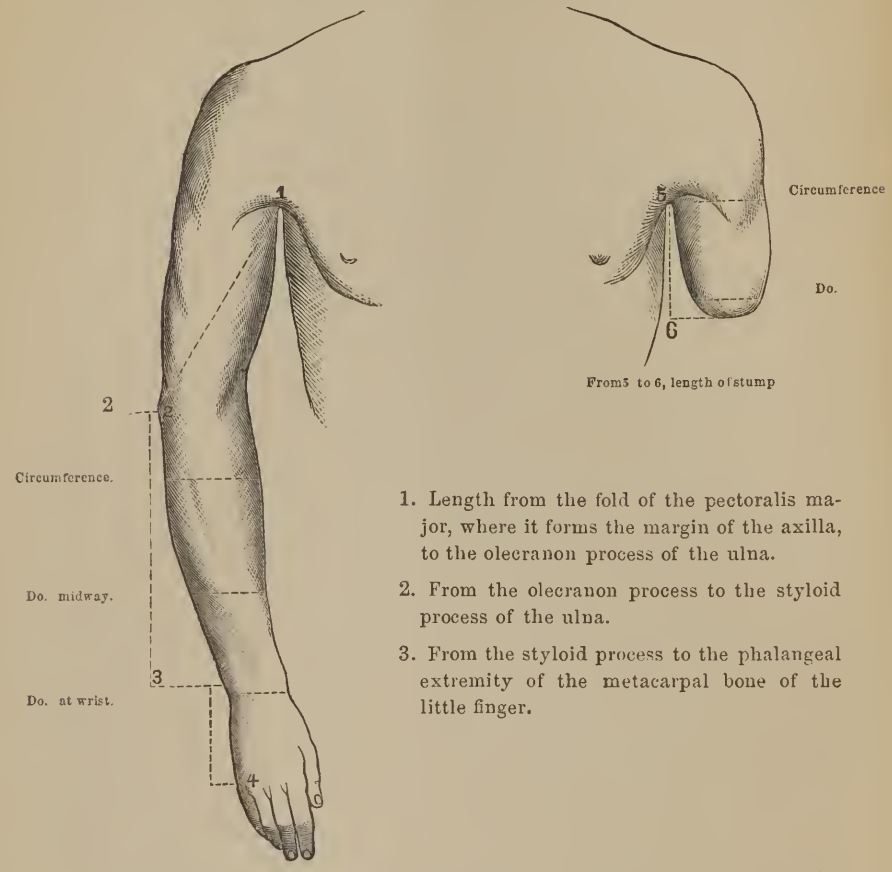
(Signed) HENRY CAMPBELL, M.D., Augusta, Ga.
R. A. T. RIDLEY, M.D., Lagrange, Ga.
THOS. S. POWELL, M.D., Atlanta, Ga.

January 22, 1867.

Directions for Measuring Patients for Artificial Arm.

Fig. 142

will be used in cases where the amputation is above the elbow and shoulder-joint.



1. Length from the fold of the pectoralis major, where it forms the margin of the axilla, to the olecranon process of the ulna.
2. From the olecranon process to the styloid process of the ulna.
3. From the styloid process to the phalangeal extremity of the metacarpal bone of the little finger.

The limbs, as represented in the figures, are in the proper positions for measuring.

In measuring the circumference of the stump, the tape should be drawn only moderately tight.

The perpendicular lines indicate the distance to be measured in order to get the length of the limb as well as the length of the stump.

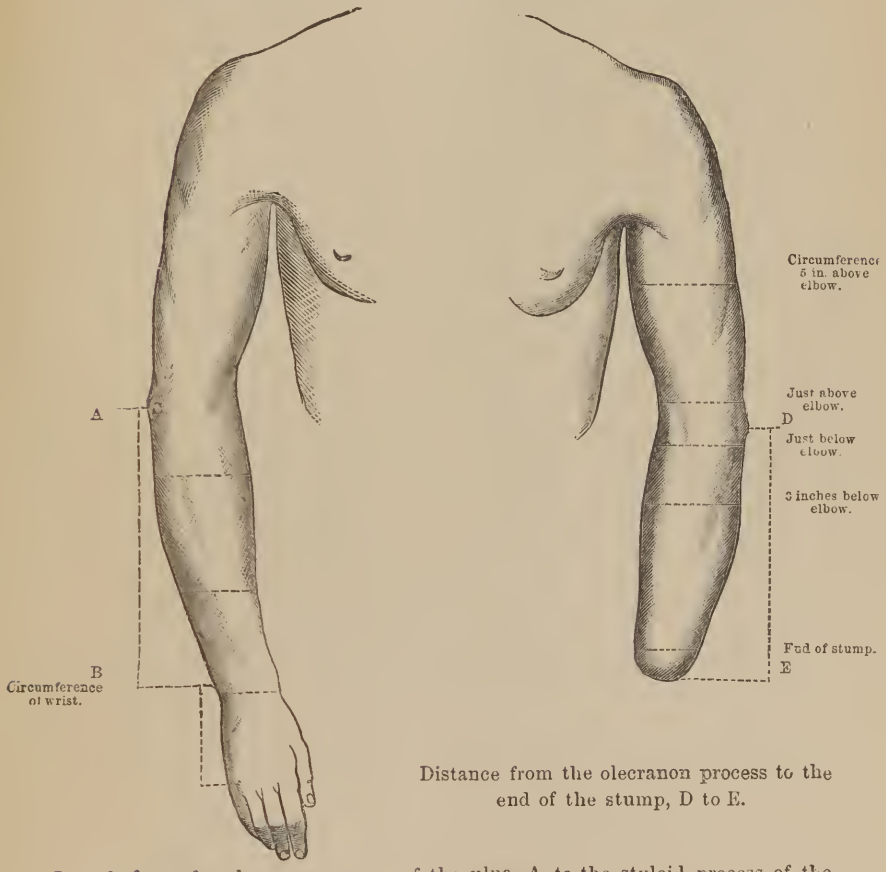
The cross-lines in the figure indicate where the circumferences are to be taken. The breadth across the shoulders, measuring on the back, must also be given; and in measuring from 1 to 2 the tape should be drawn on the inner side of the arm.

State which limb is amputated, and whether the hand be large, medium, or small size.

After taking the measure in amputation below the elbow, the arm should be laid on a sheet of paper (back down), and with a pencil, held perpendicularly, mark round it so as to give a correct profile of the shape of the stump and arm for a distance of five inches above the elbow.

Fig. 143

will be used in cases where the amputation is below the elbow and wrist.



Distance from the olecranon process to the end of the stump, D to E.

Length from the olecranon process of the ulna, A, to the styloid process of the ulna, B.

From the styloid process, B, to the phalangeal extremity of the metacarpal bone of the little finger, C.

Fig. 144.

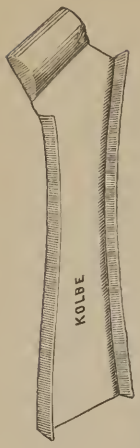
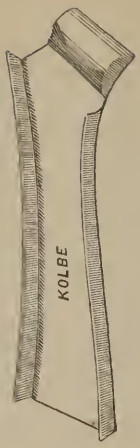
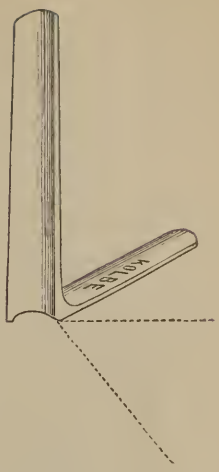


Fig. 145.



Bond's splints for fractured radius.

Fig 146.



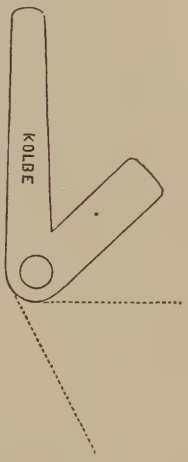
Posterior angular splint for arm.

Fig. 147.

Fig. 148.

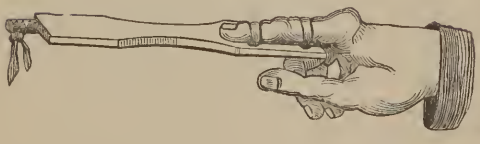
Lateral splints for legs and arms.

Fig. 149.



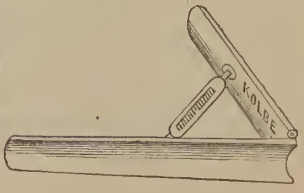
Lateral angular splint for arm.

Fig. 150.



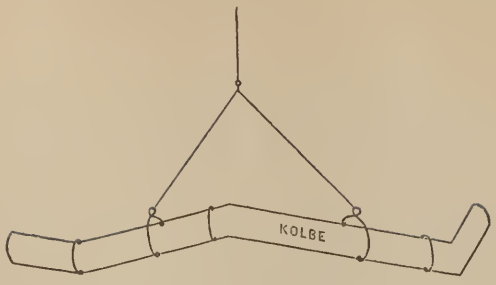
Levis' splint for reducing dislocations of the phalanges.

Fig. 151.



Stromeyer's splint for fractures or partial anchylosis of the arm or knee-joint.

Fig. 152.

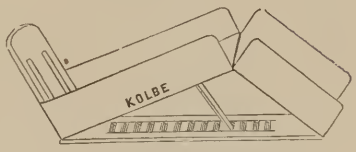


Smith's anterior splint.

Fig. 153.

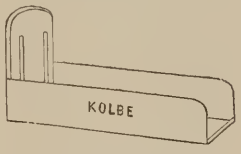
Stand, weight, and pulley for making extension in fractures and joint affections of the lower extremity.

Fig. 154.



Double inclined plane fracture-box.

Fig. 155.



Fracture-box.

Fig. 156.

Crutches of all sizes constantly on hand.

In order to illustrate a greater variety of cases to which our artificial legs have been applied, we have added a number of wood-cuts to those already shown on pages 46 and 47.

The difficulty in applying artificial support where double amputation has been performed, is at once apparent; but as it has been so successfully done, we have selected cases interesting both from their magnitude and their results.

Fig. 157 represents a boy, aged 16, who has suffered double amputation of the thighs close to the body. He has crawled on his hands and body about Harrisburg, Pa. (his native city), for three years, during which time he attracted the attention of a sympathizing public. Lately, the Managers and Surgeons of the Philadelphia Orthopædic Hospital (to which I am the mechanist) have been enabled (through the liberality of the State Legislature) to provide the means for the construction of the artificial limbs herewith shown in Fig. 158, and by which he is able to walk. To our knowledge, this is the only successful case on record in which artificial limbs have been applied where both knee-joints are required to be artificial.

Fig. 157.

Amputation through both thighs close to the body. Result of railroad accident. (From photograph.)

Fig. 158.

Artificial limbs applied. (From photograph.)

Fig. 159 shows a patient with double amputation ; one through the leg, and the other through the foot.

Fig. 160 shows the patient with both limbs applied.

Fig. 161 shows a young man who has suffered double amputation through both legs.

Fig. 162 showing patient with limbs applied.

Fig. 163 shows a patient with double amputation through both legs.

Fig. 164 showing patient with limbs applied.

Fig. 159.

Amputation through the leg and foot. Result of frost-bite. (From photograph.)

Fig. 160.

Artificial limbs applied. (From photograph.)

Fig. 161.

Amputation through both legs. Result of frost-bite. (From photograph.)

Fig. 162.

Artificial limbs applied. (From photograph.)

Fig. 163.

Amputation through both legs. Result of railroad accident. (From photograph.)

Fig. 164.

Artificial limbs applied. (From photograph.)

Two Prize Medals Awarded by the U. S. Centennial Commission.